Size, Age, Meristics and Morphometrics of Chum Salmon Returning to British Columbia during 1983-1985

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SIZE, AGE, MERISTICS AND MORPHOMETRICS OF CHUM SALMON RETURNING TO BRITISH COLUMBIA DURING 1983-1985

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ABSTRACT

Barner, L. W., C. B. Murray, and T. D. Beacham. 1986. Size, age, meristics and morphometrics of chum salmon returning to British Columbia during 1983-1985. Can. Tech. Rep. Fish. Aquat. Sci. 1484: 39 p.

Differences in sex ratios-at-age, mean length-at-age, age composition, meristics, and morphometrics were investigated for spawning chum stocks in five regions: north coast, Queen Charlotte Islands, central coast, west coast Vancouver Island, and south coast of British Columbia. Chum salmon from the Queen Charlotte Islands and the west coast of Vancouver Island were generally shorter than those from mainland British Columbia. Chum salmon from the north coast were older than those from the west coast of Vancouver Island and the central coast. Chum salmon from the Queen Charlotte Islands had the highest gill raker counts, whereas those from the south coast of British Columbia had the lowest gill raker and branchiostegal ray counts. Males had larger heads, larger dorsal fins, and thicker caudal peduncles than did females. Morphometric characters also varied among stocks within regions and among regions.

RESUME

Barner, L. W., C. B. Murray, and T. D. Beacham. 1986. Size, age, meristics and morphometrics of chum salmon returning to British Columbia during 1983-1985. Can. Tech. Rep. Fish. Aquat. Sci. 1484: 39 p.

Dans cinq régions de la Colombie-Britannique (côte nord, île Reine-Charlotte, côte centrale, côte ouest de l'île Vancouver et côte sud), on a relevé les différences pour ce qui est de la proportion relative des sexes selon l'âge, la longueur moyenne selon l'âge, la répartition des classes d'âge et les caractères méristiques et morphométriques chez des stocks de saumon kéta reproducteurs. En général, les individus fréquentant les eaux des îles Reine-Charlotte et la côte ouest de l'île Vancouver étaient de taille inférieure à ceux peuplant le littoral continental, tandis que ceux de la côte nord étaient plus vieux que les kétas de la côte ouest de l'île Vancouver et de la côte centrale. Les saumons des îles Reine-Charlotte possédaient le plus grand nombre de branchiospines tradis que ceux du littoral sud de la C.-B. avaient le plus faible nombre de branchiospones et de rayons branchiostèges. La longeur de la tête, la hauteur de la nageoire dorsale et l'épaisseur du pédoncule caudal étaient plus grandes chez le mâle. De plus, les caractères morphométriques variaient selon les stocks à l'intérieur des régions et d'une région à l'autre.

INTRODUCTION

In British Columbia, chum salmon (Oncorhynchus keta) return to spawn in their natal streams from August through January. Spawning at specific times and locations leads to the existence of discrete stocks that may be adapted to environmental conditions in their natal streams. Beacham et al. (1983) examined chum salmon stocks spawning in southern British Columbia during 1981-1982 for variation in age at maturity, size at maturity, and body morphology. In this report we continue that investigation for stocks spawning during 1983-1985 in selected regions in British Columbia.

MATERIALS AND METHODS

Differences in sex ratio, mean length-at-age, age composition, meristics, and morphometrics were investigated for chum salmon from five regions in British Columbia. Regions were defined as: Queen Charlotte Islands, north coast of British Columbia, central coast of British Columbia, west coast of Vancouver Island, and the south coast of mainland British Columbia. Chum salmon in British Columbia were sampled from 7 south coast stocks, 15 west coast of Vancouver Island stocks, 13 central coast stocks, 7 north coast stocks, and 10 Queen Charlotte Islands stocks (Fig. 1; Table 1). The biological characteristics recorded included sex, postorbital-hypural length to the nearest mm, number of gill rakers on left most anterior gill arch, number of branchiostegal rays on the left side, postorbital head length (Vladykov 1962), caudal peduncle depth, and length of the base and height of both the anal and dorsal fins (Hubbs and Lagler 1958). All measurements and observations were recorded on freshly caught fish (sampling gear is indicated in Table 1) in the field. Morphometric characters were measured with calipers to the nearest mm. Scales were also collected for age determination as outlined by Bilton and Ricker (1965) and La Lanne and Safsten (1969). Sex was confirmed by internal examination.

There were significantly different allometric regressions ($\log_e$ morphometric character = $\log_e$ a + b $\log_e$ length) between sexes and among stocks within each region. Morphometric measurements of both males and females were standardized to the mean postorbital-hypural length of 600 mm by the method outlined by Beacham and Murray (1983), thereby minimizing variability as a result of allometric growth and differences in mean size of individuals among stocks. There were separate sex and stock regressions done to standardize measurements from the spawning ground samples. This allometric regression to a standard size is a preferred method of removing size variation in morphometric characters among individuals (Reist 1985).

Variation in mean length-at-age was analyzed with the analysis of variance model:

$$Y_{ijk\ell} = \mu + A_i + S_j + R_k + e_{ijk\ell}$$

where $Y_{ijk\ell}$ = observed length
A_i = effect of age (i=3-5)
S_j = effect of sex (j=1-2)
R_k = effect of region (k=1-5)
$e_{ijk\ell}$ = error term for ℓ'th observation in subgroup ijk.

Variation in meristic characters was examined with a two-way analysis of variance, with region and sex as the indices. Morphometric variation was examined with a similar two-way analysis of variance model.

RESULTS

SEX RATIO

The analysis of sex ratios by age indicated some consistent trends with the samples pooled by regions (Table 2). For all regions combined, the proportion of males was higher at age 3 than at age 4 (χ^2 = 7.59, df=1, P<0.01) and at age 5 than at age 4 (χ^2 = 3.47, 0.05<P<0.10). The proportion of males returning to spawn at age 3 and 5 were similar (χ^2 = 0.27, P>0.10). Males were relatively more abundant in the spawning population at age 3 and 5 than they were at age 4. For all regions combined, 59.9% of the age 3 chum salmon sampled were males, as were 56.4% of the age 4 salmon and 61.3% of the age 5 salmon.

MEAN LENGTH

Mean length-at-age for age 3 to age 5 chum salmon sampled from 1983 to 1985 is presented in Table 3. Significant differences in mean length-at-age of chum salmon were observed among chum salmon from different regions ($F_{4,6185}$=31.3, P<0.01). The Queen Charlotte Island chums were generally smaller than those in the other regions, with males averaging 55.5 cm and females 54.5 cm in length. Chum salmon from the south coast of mainland British Columbia were the largest, with males averaging 59.4 cm and females 58.2 cm in length.

Males were larger than females at all ages examined ($F_{1,6185}$=48.1, P<0.01). Male and female chum salmon of different ages were of considerably different lengths ($F_{2,6185}$=733.4, P<0.01). With all regions pooled, age 3 males were 53.8 cm, age 4 males 59.2 cm, and age 5 males 62.2 cm in length. Age 3 females were 52.7 cm, age 4 females 57.5 cm, and age 5 females 60.0 cm in length. With chum salmon of all ages and from all regions combined, males were 57.3 cm and females 55.9 cm in length.

Three age 2 and four age 6 chum salmon were also sampled on the spawning grounds. All the age 2 chum salmon were collected from three rivers (Marble, Tahsish, Nitinat) on the west coast of Vancouver Island. The single female was 53.9 cm in length and the two males had a mean length of 49.7 cm. Of the four age 6 chum salmon collected, one female from the Queen Charlotte Islands (Security Cr.) was 62 cm in length. Two males from the north coast (Toon R.) had a mean length of 66.7 cm, and one female from the west coast of Vancouver Island (Conuma R.) was 56.0 cm in length.

AGE OF RETURN

Of the chum salmon collected from the Queen Charlotte Islands, 42.4% were age 3, 53.1% age 4, and 4.3% age 5 (Table 4). On the north coast of British Columbia, only 8.4% of the chum salmon were age 3, 83.1% were age 4 and 8.4% were age 5. Chum salmon from the central coast of British Columbia were 48.7% age 3, 46.2% age 4, and 4.1% age 5. West coast of Vancouver Island chum salmon were 48.7% age 3, 49.5% age 4, and 1.6% age 5. On the south coast of British Columbia chum salmon were 24.4% age 3, 54.0% age 4, and 21.6% age 5.

Age at maturity of chum salmon ranged from two to six years, with three and four year olds being the dominant age at maturity. Chum salmon from the north coast and south coast of British Columbia were the oldest fish, with an overall mean age of 4.0 years for each area. The youngest chum salmon were found on the Queen Charlotte Islands (mean age 3.6 years) and on the west coast of Vancouver Island (mean age 3.5 years). The early-spawning stocks on the northern and central coastal regions of British Columbia were older than the later-spawning stocks on the Queen Charlotte Islands and the west coast of Vancouver Island.

MERISTICS

Number of gill rakers on individual chum salmon ranged from 17 to 28 (Table 5). Grouping the streams into geographic regions showed that mean gill raker counts among regions were significantly different ($F_{4,5117} = 61.8$, $P<0.01$). There was no significant difference between sexes for gill raker counts ($F_{1,5112} = 0.19$, $P>0.10$). Chum salmon from the Queen Charlotte Islands had the highest mean number of gill rakers (23.23), and those from the central coast, west coast Vancouver Island, north coast, and south coast had mean gill raker counts of 23.13, 23.07, 22.89, and 22.44, respectively.

Numbers of branchiostegal rays on individual chum salmon ranged from 10 to 17 (Table 6). There were no significant differences between the sexes for mean number of branchiostegal rays ($F_{1,5112} = 2.0$, $P>0.10$). However, there was a significant difference for mean number of branchiostegal rays among regions ($F = 34.1$, df 4, 5117, $P<0.01$). Chum salmon from the west coast of Vancouver Island had the greatest number of

branchiostegal rays (13.73), with those from the central coast, Queen Charlotte Islands, north coast, and south coast having 13.65, 13.49, 13.44 and 13.32, respectively. Chum salmon in an area characterized by a lower number of gill rakers also had a lower number of branchiostegal rays ($r = 0.86$, $n = 7$, $P<0.05$).

MORPHOMETRICS

All morphometric measurements in this report were standardized to 60.0 cm postorbital-hypural length by individual sex and stock allometric regressions. Two way analysis of variance (indices were region and sex) indicated that there were significant differences in postorbital head length between sexes ($F_{1,5112} = 3101.4$, $P<0.01$), with males having larger heads than females. Males also had thicker caudal peduncles than females ($F = 254.6$, $P<0.01$). Females always had a greater anal fin base ($F=53.2$, $P<0.01$) and anal fin height ($F=24.1$, $P<0.01$) than males. However, males always had a greater dorsal fin base ($F=2027.7$, $P<0.01$) and dorsal fin height ($F=1163.9$, $P<0.01$) than females.

In all cases, regional variation in body morphology of chum salmon was apparent (Tables 7, 8). Chum salmon from the Queen Charlotte Island had larger heads ($F_{4,5112}=21.2$, $P<0.01$) and thicker caudal peduncles ($F=107.0$, $P<0.01$) than those from the other regions. Although significantly variable among regions, the size of the anal fin base ($F=93.0$, $P<0.01$), anal fin height ($F=32.5$, $P<0.01$), dorsal fin base ($F=90.1$, $P<0.01$) and dorsal fin height ($F=61.7$, $P<0.01$) was not consistently larger or smaller for chum salmon in any specific region.

DISCUSSION

Chum salmon return to spawn in their natal rivers at specific periods of the year, and this segregation in time and space at spawning results in the existence of discrete stocks. As environments in the rivers vary, chum salmon in the different stocks should have different biological adaptations. In the present study, we examined variation in age compositions and morphology of chum salmon in different regions of British Columbia. Males were more abundant than females at all ages examined, but the proportion of males was higher in the younger (age 2, 3) and older (age 5) ages of maturity. Greater abundance of males than females at all ages is likely due to selective sampling of males by gillnets. Higher proportions of males in the younger ages of maturity may be a result of faster growth rates of males than females (Sano 1966), as has been indicated for other Oncorhynchus species (Foerster 1968; Bilton et al. 1982). High proportions of males in the older age classes may be a result of selection for large body size, as large males have an advantage over small males in competition for females during spawning (Schroder 1981).

Age at maturity in chum salmon is dependent both on timing of spawning (Birman 1977; Beacham 1984) and stock abundance (Birman 1951; Beacham and Starr 1982). Chum salmon in northern and central coastal regions of British Columbia, spawning about two months earlier than those in southern British Columbia, had older ages of maturity than those spawning in southern regions, as illustrated by Ricker (1980). Timing of spawning in Pacific salmon can have a genetic component (Bams 1976; Taylor 1980), so that regional variation in age at maturity can have a genetic component.

There was regional differentiation in gill raker and branchiostegal ray frequencies, with stocks in the northern regions generally having more elements in these characters than those in southern regions. Meristic variation in Pacific salmon has both an environmental and genetic component (McCart and Andersen 1967; Beacham and Murray 1986). Genetic variability in chum salmon is more closely associated with variability in meristic characters than in morphometric ones (Beacham and Withler 1985). Regional differences in gill raker and branchiostegal ray frequencies may be indicative of genetic differentiation in chum salmon among the regions examined.

At spawning, Pacific salmon are usually markedly sexually dimorphic, with dimorphism reported for many morphometric characters (Vladykov 1962; Beacham and Murray 1983). Males generally have larger heads, thicker caudal peduncles, and a larger dorsal fin than do females (Svetovidova 1961; Beacham 1984), and the results of our present study confirm these trends. Female salmon can have a larger anal fin than males (Berg 1979; Beacham 1984), presumably because females dig the nests and measure the depth of the nest with the anal fin (Schroder 1981). Regional variation in the morphometric characters examined may be indicative of different environments, as chum salmon are adapted morphometrically to rivers of different size (Beacham 1984).

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Table 1. Areas sampled, time of sampling and gear used to collect chum salmon in British Columbia.

Area	Date			Gear
		North Coast		
Toon River	14	August	1984	Gillnet
Khutzeymateen River	15	August	1984	Gillnet
Kitsault River	20	August	1984	Gillnet
Kitsault River	27	August	1984	Gillnet
Stagoo River	21	August	1984	Gillnet
Stagoo River	26	August	1985	Gillnet
Kshwan River	21	August	1984	Gillnet
Kshwan River	28	August	1985	Gillnet
Nass River	29	August	1984	Gillnet
Ecstall River	7	September	1984	Gillnet
		Queen Charlotte Islands		
Tasu Creek	11	September	1984	Gillnet
Security Inlet Creek	12	September	1984	Gillnet
Stanley Creek	13	September	1984	Pew
Deena Creek	14	September	1984	Gillnet
Lagins Creek	16	September	1984	Seine
Pallant Creek	10	October	1984	Gillnet
Ain River	13	October	1984	Gillnet
Lagoon Creek	14	October	1984	Gillnet
Awun River	15	October	1984	Gillnet
Salmon River	16	October	1984	Gillnet
		Central Coast		
Bella Coola River	31	July	1984	Weir
Bella Coola River	12	August	1985	Weir
Kemano River	22	August	1984	Seine
Kemano River	21	August	1985	Gillnet
Kimsquit River	24	August	1984	Gillnet
Kimsquit River	6	September	1985	Gillnet
Clyak River	25	August	1984	Gillnet
Kitimat River	25	August	1984	Gillnet
Mussel River	10	September	1985	Gillnet
Neekas River	12	September	1984	Gillnet
Kainet River	13	September	1984	Gillnet
Nekite River	15	September	1984	Gillnet
Nekite River	13	September	1985	Gillnet
Green River	14	September	1985	Gillnet
Cascade River	16	September	1985	Gillnet
Elcho River	18	September	1985	Gillnet
Wannock River	9	November	1984	Gillnet

Table 1 (cont'd)

Area	Date			Gear
	West Coast Vancouver Island			
Conuma River	2	October	1984	Gillnet
Conuma River	23	October	1985	Seine
Stephens Creek	23	October	1984	Seine
Marble River	24	October	1984	Gillnet
Nitinat River	26	October	1984	Seine
Nitinat River	28	October	1985	Seine
Sarita River	29	October	1984	Gillnet
Sarita River	6	November	1985	Gillnet
Thornton Creek	30	October	1984	Seine
Tahsish River	31	October	1984	Gillnet
Atleo River	8	November	1984	Gillnet
Atleo River	7	November	1985	Gillnet
Nahmint River	18	October	1985	Gillnet
Sucwoa River	22	October	1985	Seine
Canton River	23	October	1985	Seine
Tahsis River	24	October	1985	Gillnet
Zebellos River	30	October	1985	Gillnet
Burman River	31	October	1985	Gillnet
Megin River	4	November	1985	Gillnet
	South Coast			
Orford River	15	September	1983	Gillnet
Homathko River	24	October	1983	Gillnet
Toba River	27	October	1983	Gillnet
Squamish River	1	December	1983	Gillnet
Alouette River	18	October	1983	Seine
Chilqua Slough	24	November	1983	Seine
Chehalis River	20	October	1983	Seine

Table 2. Sex ratios of chum salmon, ages 3 through 5 years, sampled on the spawning grounds on the Queen Charlotte Island, mainland British Columbia (north, central, and south coast) and west coast Vancouver Island.

Area	Year	Age 3		Age 4		Age 5	
		N	% Male	N	% Male	N	% Male
Queen Charlotte Islands							
Stanley Creek	1984	34	47.1	32	25.0	0	0.0
Ain River	1984	47	76.6	41	87.8	12	83.3
Awun River	1984	48	85.4	44	77.2	8	75.0
Lagin Creek	1984	42	73.8	54	81.5	4	100.0
Security Creek	1984	16	62.5	83	75.9	1	0.0
Deena River	1984	45	28.9	51	54.9	3	66.7
Pallant Creek	1984	50	38.0	46	39.1	4	75.0
Lagoon Creek	1984	37	64.9	61	59.0	2	50.0
Tasu River	1984	57	80.7	35	82.9	8	100.0
Salmon River	1984	34	73.5	66	53.0	0	0.0
Total		410	63.7	513	64.5	42	81.0
North Coast							
Toon River	1984	2	100.0	83	66.3	15	80.0
Khutzeymateen River	1984	3	100.0	95	63.2	2	50.0
Kitsault River	1984	1	100.0	95	48.4	4	75.0
Kitsault River	1985	6	100.0	77	59.7	17	52.9
Stagoo River	1984	0	0.0	88	55.7	12	50.0
Stagoo River	1985	13	53.8	76	47.4	11	45.5
Kshwan River	1984	4	75.0	85	64.7	11	45.5
Kshwan River	1985	46	87.0	43	81.4	11	90.9
Nass River	1984	6	50.0	95	45.3	0	0.0
Ecstall River	1984	3	33.3	96	53.1	1	0.0
Total		84	78.6	833	57.1	84	60.7

Table 2 (cont'd)

Area	Year	Age 3 N	Age 3 % Male	Age 4 N	Age 4 % Male	Age 5 N	Age 5 % Male
			Central Coast				
Bella Coola River	1984	3	66.7	91	37.4	6	33.3
Bella coola River	1985	19	68.4	78	29.5	3	66.7
Kemano River	1984	37	75.7	62	71.0	1	100.0
Kemano River	1985	7	71.4	87	82.8	6	100.0
Kimsquit River	1984	20	70.0	63	49.2	17	64.7
Kimsquit River	1985	83	59.0	17	52.9	0	0.0
Clyak River	1984	24	54.2	26	42.3	27	70.4
Kitimat River	1984	45	60.0	55	45.5	0	0.0
Mussel River	1985	56	50.0	44	47.7	0	0.0
Neekas Creek	1984	22	63.6	52	65.4	1	100.0
Kainet Creek	1984	49	57.1	46	71.7	5	60.0
Nekite River	1984	89	46.1	10	30.0	1	100.0
Nekite River	1985	52	59.6	48	60.4	0	0.0
Green River	1985	64	59.4	36	58.3	0	0.0
Cascade River	1985	90	68.9	10	60.0	0	0.0
Elcho River	1985	75	57.3	25	84.0	0	0.0
Wannock River	1984	86	73.3	13	84.6	1	100.0
Total		821	60.8	763	56.1	68	69.1
			West Coast Vancouver Island				
Stephens Creek	1984	87	60.9	11	72.7	2	100.0
Marble River	1984	74	66.2	22	63.6	0	0.0
Tahsish River	1984	86	60.5	12	58.3	1	100.0
Zebellos River	1985	22	63.6	78	53.8	0	0.0
Tahsis River	1985	11	72.7	87	56.3	2	50.0
Sucwoa River	1985	26	65.4	74	44.6	0	0.0
Canton River	1985	60	53.3	40	57.5	0	0.0
Conuma River	1984	50	52.0	48	52.1	1	0.0
Conuma River	1985	55	54.5	45	44.4	0	0.0
Burman River	1985	21	71.4	76	60.5	3	33.3
Megin River	1985	55	41.8	45	42.2	0	0.0
Atleo River	1984	91	69.2	9	88.9	0	0.0
Atleo River	1985	36	63.9	64	46.9	0	0.0
Thornton Creek	1984	87	56.3	13	53.8	0	0.0
Nahmint River	1985	10	100.0	89	60.7	1	100.0
Sarita River	1984	37	67.6	47	57.4	16	81.3
Sarita River	1985	15	60.0	83	63.9	2	100.0
Nitinat River	1984	98	49.0	1	100.0	0	0.0
Nitinat River	1985	3	67.0	96	49.0	1	100.0
Total		924	59.3	940	54.6	29	75.9

Table 2 (cont'd)

Area	Year	Age 3 N	Age 3 % Male	Age 4 N	Age 4 % Male	Age 5 N	Age 5 % Male
				South Coast			
Orford River	1983	1	100.0	54	57.4	45	42.2
Homathko River	1983	32	31.3	56	37.5	18	50.0
Toba River	1983	20	45.0	68	45.6	10	50.0
Squamish River	1983	19	21.0	66	31.8	15	33.3
Alouette River	1983	2	0.0	59	69.5	39	64.1
Chilqua Slough	1983	97	48.5	2	100.0	1	0.0
Chehalis River	1983	1	0.0	75	48.0	24	54.2
Total		172	41.3	380	48.2	152	50.0

Table 3. Mean postorbital length (cm) -at-age for chum salmon sampled in British Columbia during 1983 to 1985. Standard deviations are in parenthesis. Sample size is below length.

Area	Year	Age 3		Age 4		Age 5	
		Male	Female	Male	Female	Male	Female
				Queen Charlotte Islands			
Stanley Creek	1984	49.0(1.3) 16	48.3(2.5) 18	52.7(3.0) 8	51.9(3.1) 24	-	-
Ain River	1984	52.9(1.6) 36	51.5(2.7) 11	58.4(3.1) 36	55.8(3.8) 5	60.5(3.5) 10	61.2(5.9) 2
Awun River	1984	52.8(2.8) 41	53.4(2.8) 7	57.0(2.0) 34	57.3(1.6) 10	60.5(1.1) 6	62.4(2.0) 2
Lagins Creek	1984	50.4(2.6) 31	50.4(3.2) 11	54.6(3.0) 44	53.7(3.7) 10	56.4(2.2) 4	-
Security Creek	1984	52.3(2.3) 10	50.5(3.2) 6	56.3(3.2) 63	56.1(2.3) 20	-	55.8(0.0) 1
Deena River	1984	53.7(3.1) 13	52.2(2.3) 32	57.7(3.0) 28	56.0(3.2) 23	58.6(4.5) 2	54.7(0.0) 1
Pallant Creek	1984	56.5(2.4) 19	54.4(1.9) 31	59.7(2.7) 18	58.8(3.0) 28	64.1(5.6) 3	63.4(0.0) 1
Lagoon Creek	1984	53.7(2.7) 24	52.6(2.4) 13	59.4(3.2) 36	57.3(2.9) 25	60.7(0.0) 1	61.1(0.0) 1
Tasu River	1984	52.2(2.5) 46	51.1(0.7) 11	56.0(3.2) 29	56.1(0.8) 6	61.2(3.3) 8	-
Salmon River	1984	55.4(4.0) 25	55.6(0.8) 9	57.7(3.4) 35	57.1(0.6) 31	-	-
Mean		52.8(3.2 261	52.2(3.1) 149	57.0(3.4) 331	56.2(3.6) 182	60.4(3.5) 34	60.3(4.0) 8

Table 3 (cont'd)

Area	Year	Age 3		Age 4		Age 5	
		Male	Female	Male	Female	Male	Female
				North Coast			
Kshwan River	1984	57.1(7.1) 3	57.1(0.0) 1	60.9(3.6) 55	57.5(3.0) 30	62.5(4.2) 5	56.3(10.8) 6
Kshwan River	1985	49.9(3.2) 40	48.9(1.6) 6	56.4(4.5) 35	55.2(3.7) 8	61.1(3.0) 10	55.0(0.0) 1
Kitsault River	1984	57.9(0) 1	-	59.4(3.6) 46	57.1(3.7) 49	64.2(1.8) 3	59.4(0.0) 1
Kitsault River	1985	50.8(4.9) 6	-	55.2(3.8) 46	54.1(2.7) 31	60.3(2.9) 9	58.6(2.1) 8
Stagoo River	1984	-	-	59.7(3.7) 49	56.6(3.4) 39	61.2(2.4) 6	59.8(3.6) 6
Stagoo River	1985	50.8(7.2) 7	48.9(2.0) 6	58.2(4.6) 36	53.7(2.9) 40	60.6(4.6) 5	59.4(6.4) 6
Nass River	1984	58.9(5.5) 3	56.3(5.0) 3	63.7(3.5) 43	61.3(3.0) 52	-	-
Khutzeymateen River	1984	61.2(5.4) 3	-	64.1(2.7) 60	59.1(3.1) 35	65.7(0.0) 1	61.9(0.0) 1
Toon River	1984	59.8(3.9) 2	-	61.2(3.5) 55	58.9(3.8) 28	64.2(2.8) 12	59.9(8.1) 3
Ecstall River	1984	54.8(0.0) 1	48.3(10.3) 2	63.4(3.0) 51	58.6(4.0) 45	-	62.8(0.0) 1
Mean		51.8(5.4) 66	50.5(4.7) 18	60.5(4.6) 476	57.5(4.1) 357	62.0(3.4) 51	58.8(5.9) 33

Table 3 (cont'd)

Area	Year	Age 3		Age 4		Age 5	
		Male	Female	Male	Female	Male	Female
				Central Coast			
Bella Coola River	1984	59.7(1.7) 2	57.4(0.0) 1	65.5(3.8) 34	64.5(2.5) 57	68.2(4.5) 2	63.4(3.0) 4
Bella Coola River	1985	54.9(3.7) 13	56.0(4.3) 6	60.0(3.7) 23	59.5(3.4) 55	67.1(0.9) 2	62.1(0.0) 1
Kemano River	1984	59.3(2.7) 28	56.9(2.9) 9	64.0(3.6) 44	60.7(2.6) 18	66.1(0.0) 1	-
Kemano River	1985	64.3(3.4) 5	51.3(1.1) 2	63.1(3.7) 72	57.4(3.1) 15	66.9(4.7) 6	-
Kimsquit River	1984	58.7(3.3) 14	55.2(2.7) 6	62.5(3.2) 31	60.0(3.7) 32	66.9(2.6) 11	66.0(2.0) 6
Kimsquit River	1985	53.3(3.4) 49	50.2(2.2) 34	55.7(2.7) 9	53.0(3.2) 8	-	-
Clyak River	1984	57.3(2.5) 13	56.3(1.5) 11	63.7(3.1) 11	60.8(3.2) 15	(67.3(3.3) 19	61.4(2.9) 8
Kitimat River	1984	57.1(3.0) 27	54.7(4.0) 18	60.4(4.8) 25	58.3(3.7) 30	-	-
Mussel River	1985	52.3(3.0) 28	48.9(3.1) 28	54.5(3.5) 21	52.1(2.4) 23	-	-
Neekas River	1984	54.5(2.5) 14	55.7(3.9) 8	57.1(3.9) 34	56.6(4.5) 18	-	-
Kainet River	1984	56.3(3.1) 28	53.5(2.8) 21	62.4(4.6) 33	57.7(4.6) 13	59.0(0.0) 1	-
Nekite River	1984	57.9(3.7) 41	55.7(2.7) 48	57.1(4.4) 3	59.1(3.8) 7	65.5(1.1) 3	62.2(5.9) 2
Nekite River	1985	52.0(4.4) 31	49.5(2.4) 21	57.3(4.1) 29	53.7(2.6) 19	61.5(0.0) 1	-
Green River	1985	52.9(3.0) 38	50.8(2.1) 26	57.9(4.2) 21	54.4(3.2) 15	-	-
Cascade River	1985	48.0(4.0) 62	47.9(2.1) 28	51.4(6.1) 6	51.9(3.4) 4	-	-
						-	-

Table 3 (cont'd)

Area	Year	Age 3 Male	Age 3 Female	Age 4 Male	Age 4 Female	Age 5 Male	Age 5 Female
Central Coast (cont'd)							
Elcho River	1985	47.7(3.9) 43	48.4(2.5) 32	50.5(5.0) 21	49.6(3.0) 4	- -	- -
Wannock River	1984	61.3(3.2) 63	58.2(2.1) 23	63.5(2.8) 11	58.5(1.4) 2	68.0(0.0) 1	- -
Mean		54.6(5.7) 499	52.3(4.3) 322	60.5(5.6) 428	58.6(4.9) 335	66.8(3.3) 47	63.2(3.3) 21
West Coast Vancouver Island							
Stephens Creek	1984	52.0(3.1) 53	51.0(2.5) 34	57.5(2.7) 8	55.2(1.1) 3	58.8(3.1) 2	- -
Marble River	1984	53.2(2.8) 49	52.7(2.6) 25	59.1(2.7) 14	55.8(2.4) 8	- -	- -
Tahsish River	1984	54.8(3.3) 52	53.6(2.2) 34	57.1(3.5) 7	57.4(2.9) 5	53.7(0.0) 1	- -
Zeballos River	1985	52.6(1.9) 14	52.0(2.6) 8	58.4(3.0) 42	55.5(3.1) 36	- -	- -
Tahsis River	1985	55.0(2.4) 8	52.8(2.8) 3	57.9(3.1) 49	56.1(3.0) 38	53.5(0.0) 1	59.5(0.0) 1
Sucwoa River	1985	53.7(2.2) 17	53.4(1.6) 9	58.1(3.3) 33	56.5(2.7) 41	- -	- -
Canton River	1985	52.7(2.4) 32	51.0(1.8) 28	57.2(2.8) 23	55.9(4.5) 17	- -	- -
Conuma River	1984	55.5(1.9) 26	54.3(2.2) 24	59.4(3.3) 25	57.3(3.1) 23	- -	61.0(0.0) 1

Table 3 (cont'd)

Area	Year	Age 3 Male	Age 3 Female	Age 4 Male	Age 4 Female	Age 5 Male	Age 5 Female
				West Coast Vancouver Island (cont'd)			
Conuma River	1985	51.5(2.2) 30	52.4(1.9) 25	54.5(2.8) 20	54.9(3.3) 25	- -	- -
Burman River	1985	54.6(3.4) 15	51.8(1.5) 6	58.0(3.3) 46	56.0(3.1) 30	60.7(0.0) 1	58.3(4.3) 2
Megin River	1985	52.9(2.4) 23	51.6(2.3) 32	57.3(2.8) 19	54.0(2.8) 26	- -	- -
Atleo River	1984	54.0(3.0) 63	52.9(2.6) 28	59.4(3.4) 8	62.5(0.0) 1	- -	- -
Atleo River	1985	52.1(2.9) 23	50.9(2.7) 13	55.9(3.4) 30	54.5(2.1) 34	- -	- -
Thornton Creek	1984	52.3(2.9 49	54.1(3.1) 38	57.0(3.5) 7	57.5(2.2) 6	- -	- -
Nahmint River	1985	54.5(3.2) 10	- -	58.9(3.3) 54	57.4(2.4) 35	55.8(0.0) 1	- -
Sarita River	1984	54.8(2.4) 25	54.6(2.0) 12	60.0(3.4) 27	57.9(2.2) 20	62.0(2.8) 13	59.8(0.5) 3
Sarita River	1985	57.8(3.7) 9	54.4(4.2) 6	57.4(3.4) 53	55.3(3.6) 30	52.8(2.5) 2	- -
Nitinat River	1984	56.6(2.1) 48	55.5(2.7) 50	62.9(0.0) 1	- -	- -	- -
Nitinat River	1985	52.9(1.6) 2	59.7(0.0) 1	59.3(2.4) 47	57.9(2.9) 49	56.9(0.0) 1	- -
Mean		53.7(3.1 548	53.1(2.9) 376	58.1(3.3) 513	56.2(3.1) 427	59.5(4.2) 22	59.5(2.0) 7

Table 3 (cont'd)

Area	Year	Age 3 Male	Age 3 Female	Age 4 Male	Age 4 Female	Age 5 Male	Age 5 Female
				South Coast			
Orford River	1983	53.8(0.0) 1	- -	59.5(2.7) 31	58.1(2.6) 23	62.2(3.1) 19	58.7(3.0) 26
Homathko River	1983	57.2(2.8) 10	55.6(2.8) 22	63.3(3.2) 21	60.5(2.9) 35	61.7(3.0) 9	59.1(2.5) 9
Toba River	1983	56.4(2.0) 9	55.9(2.3) 11	62.1(2.3) 31	61.7(2.5) 37	62.6(3.7) 5	60.2(4.2) 5
Squamish River	1983	56.7(0.5) 4	55.5(2.8) 15	60.1(2.1) 21	59.9(2.5) 45	62.9(2.8) 5	63.4(2.0) 10
Alouette River	1983	- -	51.3(1.1) 2	59.1(2.8) 41	58.5(2.9) 18	59.4(1.7) 25	58.7(1.9) 14
Chilqua Slough	1983	53.9(2.7) 47	52.3(2.1) 50	62.6(0.4) 2	- -	- -	57.3(0.0) 1
Chehalis River	1983	- -	54.5(0.0) 1	59.7(2.9) 36	59.0(2.1) 39	60.1(3.6) 13	60.7(2.8) 11
Mean		54.9(2.9) 71	53.9(2.9) 101	60.4(3.0) 183	59.8(2.8) 197	61.0(3.0) 76	59.7(3.1) 76

Region	Mean Male	Mean Female	Group mean
Queen Charlotte Islands	55.5(5.4) 626	54.5(4.0) 340	55.1(4.1) 966
North Coast	59.7(5.4) 595	57.3(4.5) 408	58.7(5.2) 1003
Central Coast	57.7(6.6) 974	55.8(3.4) 678	56.9(6.3) 1652
West Coast Vancouver Island	55.9(3.9) 1085	54.8(3.4) 812	55.4(3.8) 1897
South Coast	59.4(3.8) 330	58.2(3.9) 374	55.8(3.9) 704

Table 4. Percentage of chum salmon sampled by stream during 1983 to 1985, returning at age 3, 4, and 5. N is sample size.

Area	Year	N	Age 3			Age 4			Age 5		
			Male	Female	Total	Male	Female	Total	Male	Female	Total
Queen Charlotte Islands											
Stanley Creek	1984	66	24.2	27.3	51.3	12.1	36.4	48.5	0.0	0.0	0.0
Ain River	1984	100	36.0	11.0	47.0	36.0	5.0	41.0	10.0	2.0	12.0
Awun River	1984	100	41.0	7.0	48.0	34.0	10.0	44.0	6.0	2.0	8.0
Lagins Creek	1984	100	31.0	11.0	42.0	44.0	10.0	54.0	4.0	0.0	4.0
Security Creek	1984	100	10.0	6.0	16.0	63.0	20.0	83.0	0.0	1.0	1.0
Deena River	1984	100	13.0	32.0	45.0	28.0	23.0	51.0	2.0	1.0	3.0
Pallant Creek	1984	100	19.0	31.0	50.0	18.0	28.0	46.0	3.0	1.0	4.0
Lagoon Creek	1984	100	24.0	13.0	37.0	36.0	25.0	61.0	1.0	1.0	2.0
Tasu River	1984	100	46.0	11.0	57.0	29.0	6.0	35.0	8.0	0.0	8.0
Salmon River	1984	100	25.0	9.0	34.0	35.0	31.0	66.0	0.0	0.0	0.0
Total		966	27.0	15.4	42.4	34.3	18.8	53.1	3.5	0.8	4.3
North Coast											
Toon River	1984	102	2.0	0.0	2.0	53.9	27.4	81.3	11.8	2.9	14.7
Khutzeymateen River	1984	100	3.0	0.0	3.0	60.0	35.0	95.0	1.0	1.0	2.0
Kitsault River	1984	100	1.0	0.0	1.0	46.0	49.0	95.0	3.0	1.0	4.0
Kitsault River	1985	100	6.0	0.0	6.0	46.0	31.0	77.0	9.0	8.0	17.0
Stagoo River	1984	100	0.0	0.0	0.0	49.0	39.0	88.0	6.0	6.0	12.0
Stagoo River	1985	100	7.0	6.0	13.0	36.0	40.0	76.0	5.0	6.0	11.0
Kshwan River	1984	100	3.0	1.0	4.0	55.0	30.0	85.0	5.0	6.0	11.0
Kshwan River	1985	100	40.0	6.0	46.0	35.0	8.0	43.0	10.0	1.0	11.0
Nass River	1984	101	3.0	3.0	6.0	42.5	51.5	94.0	0.0	0.0	0.0
Ecstall River	1984	100	1.0	2.0	3.0	51.0	45.0	96.0	0.0	1.0	1.0
Total		1003	6.6	1.8	8.4	47.5	35.6	83.1	5.1	3.3	8.4

Table 4 (cont'd)

Area	Year	N	Age 3			Age 4			Age 5		
			Male	Female	Total	Male	Female	Total	Male	Female	Total
Central Coast											
Bella Coola River	1984	100	2.0	1.0	3.0	34.0	57.0	91.0	2.0	4.0	6.0
Bella Coola River	1985	100	13.0	6.0	19.0	23.0	55.0	78.0	2.0	1.0	3.0
Kemano River	1984	100	9.0	37.0	46.0	44.0	18.0	62.0	1.0	0.0	1.0
Kemano River	1985	100	5.0	2.0	7.0	72.0	15.0	87.0	6.0	0.0	6.0
Kimsquit River	1984	100	14.0	6.0	20.0	31.0	32.0	63.0	11.0	6.0	17.0
Kimsquit River	1985	100	49.0	34.0	83.0	9.0	8.0	17.0	0.0	0.0	0.0
Clyak River	1984	77	16.9	14.3	31.2	14.3	19.5	33.8	24.6	10.4	35.0
Kitimat River	1984	100	27.0	18.0	45.0	25.0	30.0	55.0	0.0	0.0	0.0
Mussel River	1985	100	28.0	28.0	56.0	21.0	23.0	44.0	0.0	0.0	0.0
Neekas Creek	1984	75	18.7	10.7	29.4	45.3	24.0	69.3	1.3	0.0	1.3
Kainet Creek	1984	100	28.0	21.0	49.0	33.0	13.0	46.0	3.0	2.0	5.0
Nekite River	1984	100	41.0	48.0	89.0	3.0	7.0	10.0	1.0	0.0	1.0
Nekite River	1985	100	31.0	21.0	52.0	29.0	19.0	48.0	0.0	0.0	0.0
Green River	1985	100	38.0	26.0	64.0	21.0	15.0	36.0	0.0	0.0	0.0
Cascade River	1985	100	62.0	28.0	90.0	6.0	4.0	10.0	0.0	0.0	0.0
Elcho River	1985	100	43.0	32.0	75.0	21.0	4.0	25.0	0.0	0.0	0.0
Wannock River	1984	100	63.0	23.0	86.0	11.0	2.0	13.0	1.0	0.0	1.0
Total		1652	30.2	19.5	49.7	25.9	20.3	46.2	2.8	1.3	4.1

Table 4 (cont'd)

Area	Year	N	Age 3			Age 4			Age 5		
			Male	Female	Total	Male	Female	Total	Male	Female	Total
West Coast Vancouver Island											
Stephen Creek	1984	100	53.0	34.0	87.0	8.0	3.0	11.0	2.0	0.0	2.0
Marble River	1984	97	50.5	25.8	76.3	14.4	8.2	22.6	0.0	0.0	0.0
Tahsish River	1984	100	52.0	34.0	86.6	7.0	5.0	12.0	1.0	0.0	1.0
Zeballos River	1985	100	14.0	8.0	22.0	42.0	36.0	78.0	0.0	0.0	0.0
Tahsis River	1985	100	8.0	3.0	11.0	49.0	38.0	87.0	1.0	1.0	2.0
Sucwoa River	1985	100	17.0	9.0	26.0	33.0	41.0	74.0	0.0	0.0	0.0
Canton River	1985	100	32.0	28.0	60.0	23.0	17.0	40.0	0.0	0.0	0.0
Conuma River	1984	100	26.0	24.0	50.0	25.0	23.0	48.0	0.0	1.0	1.0
Conuma River	1985	100	30.0	25.0	55.0	20.0	25.0	45.0	0.0	0.0	0.0
Burman River	1985	100	15.0	6.0	21.0	46.0	30.0	76.0	1.0	2.0	3.0
Megin River	1985	100	23.0	32.0	55.0	19.0	26.0	45.0	0.0	0.0	0.0
Atleo River	1984	100	63.0	28.0	91.0	8.0	1.0	9.0	0.0	0.0	0.0
Atleo River	1985	100	23.0	13.0	36.0	30.0	34.0	64.0	0.0	0.0	0.0
Thornton Creek	1984	100	49.0	38.0	87.0	7.0	6.0	13.0	0.0	0.0	0.0
Nahmint River	1985	100	10.0	0.0	10.0	54.0	35.0	89.0	1.0	0.0	0.0
Sarita River	1984	100	25.0	12.0	37.0	27.0	20.0	47.0	13.0	3.0	16.0
Sarita River	1985	100	9.0	6.0	15.0	53.0	30.0	83.0	2.0	0.0	2.0
Nitinat River	1984	100	48.0	50.0	98.0	1.0	0.0	1.0	0.0	0.0	0.0
Nitinat River	1985	100	2.0	1.0	3.0	47.0	49.0	95.0	1.0	0.0	1.0
Total		1897	28.9	19.8	48.7	27.0	22.5	49.5	1.2	0.4	1.5

Table 4 (cont'd)

Area	Year	N	Age 3			Age 4			Age 5		
			Male	Female	Total	Male	Female	Total	Male	Female	Total
South Coast											
Orford River	1983	100	1.0	0.0	1.0	31.0	23.0	54.0	19.0	26.0	45.0
Homathko River	1983	106	9.4	20.8	30.2	19.8	33.0	52.8	8.5	8.5	17.0
Toba River	1983	98	9.7	11.8	21.5	33.3	39.8	73.1	5.4	5.4	10.8
Squamish River	1983	100	4.0	15.0	19.0	21.0	45.0	66.0	5.0	10.0	15.0
Alouette River	1983	100	0.0	2.0	2.0	41.0	18.0	59.0	25.0	14.0	39.0
Chilqua Slough	1983	100	47.0	50.0	97.0	2.0	0.0	2.0	0.0	1.0	1.0
Chehalis River	1983	100	0.0	1.0	1.0	36.0	39.0	75.0	13.0	11.0	24.0
Total		704	10.1	14.3	24.4	26.0	28.0	54.0	10.8	10.8	21.6

Table 5. Frequency and mean number (standard deviation) of gillrakers on left anterior gill arch for chum salmon sampled during 1983 to 1985. N is sample size.

Area	Year	N	Number of gillrakers												Mean (S.D.)
			17	18	19	20	21	22	23	24	25	26	27	28	
Queen Charlotte Islands															
Stanley Creek	1984	66	0	0	0	1	5	25	18	13	4	0	0	0	22.7(1.1)
Ain River	1984	100	0	0	1	3	8	11	47	17	7	5	1	0	23.1(1.4)
Awun River	1984	100	0	0	0	0	3	9	33	36	10	8	1	0	23.7(1.2)
Lagins Creek	1984	100	0	0	0	2	11	19	44	18	3	2	1	0	22.9(1.2)
Security Creek	1984	100	0	0	0	0	3	17	45	22	11	2	0	0	23.3(1.0)
Deena River	1984	100	0	0	0	0	5	20	45	22	7	1	0	0	23.0(1.0)
Pallant Creek	1984	100	0	0	0	1	5	9	35	29	19	2	0	0	23.5(1.2)
Lagoon Creek	1984	100	0	0	0	0	5	17	40	32	3	3	0	0	23.2(1.0)
Tasu River	1984	100	0	0	0	0	5	15	37	30	12	1	0	0	23.3(1.0)
Salmon River	1984	100	0	0	0	1	3	10	37	41	8	0	0	0	23.4(1.0)
Total		966	0	0	1	8	53	152	381	260	84	24	3	0	23.2(1.1)
North Coast															
Toon River	1984	102	0	0	0	0	3	15	43	28	10	3	0	0	23.4(1.0)
Khutzeymateen River	1984	100	0	0	0	0	4	22	47	21	3	3	0	0	23.1(1.0)
Kitsault River	1984	100	0	0	0	0	8	24	34	22	11	1	0	0	23.1(1.1)
Stagoo River	1984	100	0	0	0	0	9	24	47	16	4	0	0	0	22.8(0.9)
Kshwan River	1984	100	0	0	0	0	6	25	39	27	3	0	0	0	23.0(0.9)
Nass River	1984	101	0	0	0	2	4	13	41	31	7	3	0	0	23.3(1.1)
Ecstall River	1984	100	1	3	2	12	23	22	30	6	1	0	0	0	21.8(1.5)
Total		703	1	3	2	14	57	145	281	151	39	10	0	0	22.9(1.2)

Table 5. (cont'd)

Area	Year	N	Number of gillrakers												Mean (S.D.)
			17	18	19	20	21	22	23	24	25	26	27	28	
Central Coast															
Kitimat River	1984	100	0	0	0	1	9	19	43	21	6	1	0	0	23.0(1.1)
Kemano River	1984	100	0	0	0	2	2	17	35	35	9	0	0	0	23.3(1.0)
Green River	1985	100	0	0	0	2	7	15	39	23	14	0	0	0	23.2(1.2)
Mussel River	1985	100	0	1	1	2	9	14	37	29	5	2	0	0	23.0(1.3)
Clyak River	1984	77	0	0	0	0	4	11	28	28	6	0	0	0	23.3(1.0)
Kainet Creek	1984	100	0	0	0	1	4	22	38	23	10	1	0	1	23.2(1.2)
Kimsquit River	1985	100	0	0	0	0	0	22	33	31	12	2	0	0	23.4(1.0)
Neekas Creek	1984	75	0	0	0	0	0	7	43	19	6	0	0	0	23.3(0.8)
Cascade River	1985	100	0	0	1	1	6	26	34	26	4	2	0	0	23.0(1.2)
Elcho River	1985	100	0	0	1	2	9	30	39	15	3	1	0	0	22.7(1.1)
Bella Coola River	1984	100	0	2	0	2	2	12	40	22	17	3	0	0	23.3(1.4)
Wannock River	1984	100	0	0	0	0	7	23	34	31	5	0	0	0	23.0(1.0)
Nekite River	1985	100	0	0	0	1	3	16	42	26	9	3	0	0	23.3(1.1)
Total		1252	0	3	3	14	62	234	485	329	106	15	0	1	23.0(1.1)

Table 5. (cont'd)

Area	Year	N	Number of gillrakers												Mean (S.D.)
			17	18	19	20	21	22	23	24	25	26	27	28	
West Coast Vancouver Island															
Stephens Creek	1984	100	0	0	0	0	2	20	45	28	3	2	0	0	23.2(0.9)
Marble River	1984	97	0	0	0	0	2	20	40	27	6	2	0	0	23.2(1.0)
Tahsish River	1984	100	0	0	0	0	3	18	52	21	6	0	0	0	23.1(0.9)
Zeballos River	1985	100	0	0	0	0	7	21	46	20	6	0	0	0	23.0(1.0)
Tahsis River	1985	100	0	0	0	1	9	28	30	22	9	1	0	0	22.9(1.2)
Sucwoa River	1985	100	0	0	0	0	4	16	52	22	5	1	0	0	23.1(0.9)
Canton River	1985	100	0	0	0	1	5	15	38	24	14	3	0	0	23.3(1.2)
Conuma River	1984	100	0	0	0	0	5	22	38	24	10	1	0	0	23.2(1.1)
Burman River	1985	100	0	0	0	1	8	24	42	24	1	0	0	0	22.8(1.0)
Megin River	1985	100	0	0	0	0	7	27	33	23	8	2	0	0	23.0(1.1)
Atleo River	1984	100	0	0	0	0	13	27	41	16	3	0	0	0	22.7(1.0)
Thornton Creek	1984	100	0	0	1	0	4	21	39	30	5	0	0	0	23.1(1.0)
Nahmint Creek	1985	100	0	0	0	0	5	17	37	29	8	4	0	0	23.3(1.1)
Sarita River	1984	100	0	0	0	0	8	17	44	28	3	0	0	0	23.2(1.0)
Nitinat River	1984	100	0	0	0	0	6	15	44	22	13	0	0	0	23.0(0.9)
Total		1497	0	0	1	3	88	308	621	360	100	16	0	0	23.1(1.0)
South Coast															
Orford River	1983	100	0	0	0	0	8	12	47	26	6	1	0	0	23.1(1.0)
Homathko River	1983	106	0	0	0	9	16	35	38	8	0	0	0	0	22.2(1.1)
Toba River	1983	98	0	0	1	7	17	30	35	6	2	0	0	0	22.2(1.1)
Squamish River	1983	100	0	0	0	3	23	34	32	8	0	0	0	0	22.2(1.0)
Alouette River	1983	100	0	0	3	2	19	24	34	18	0	0	0	0	22.4(1.2)
Chilqua Slough	1983	100	0	0	0	3	14	33	33	16	1	0	0	0	22.5(1.0)
Chehalis River	1983	100	0	0	2	4	13	23	36	22	0	0	0	0	22.5(1.2)
Total		704	0	0	6	28	110	191	255	104	9	1	0	0	22.4(1.1)

Table 6. Frequency and mean number (standard deviation) of branchicostegal rays on left side for chum salmon sampled during 1983 to 1985.

Area	N	Numbers of rays								Mean	(S.D.)
		10	11	12	13	14	15	16	17		
Queen Charlotte Islands											
Stanley Creek	66	0	0	9	27	24	6	0	0	13.4	(0.8)
Ain River	100	0	3	30	31	28	7	1	0	13.1	(1.0)
Awun River	100	0	2	6	24	46	21	1	0	13.8	(0.9)
Lagins Creek	100	0	0	12	44	37	7	0	0	13.4	(0.8)
Security Creek	100	0	3	8	36	38	15	0	0	13.5	(0.9)
Deena River	100	0	1	25	50	22	2	0	0	13.0	(0.8)
Pallant Creek	100	0	0	14	32	41	13	0	0	13.5	(0.9)
Lagoon Creek	100	0	0	5	39	40	16	0	0	13.7	(0.8)
Tasu Creek	100	0	1	8	36	42	12	1	0	13.6	(0.9)
Salmon River	100	0	0	7	23	49	20	1	0	13.9	(0.9)
Total	966	0	10	124	342	367	119	4	0	13.5	(0.9)
North Coast											
Kshwan River	100	0	0	17	43	29	10	1	0	13.4	(0.9)
Kitsault River	100	0	0	10	40	36	14	0	0	13.5	(0.9)
Stagoo River	100	0	1	16	56	22	4	1	0	13.2	(0.8)
Nass River	101	0	0	8	53	31	9	0	0	13.4	(0.8)
Khutzeymateen River	100	0	9	36	39	14	2	0	0	13.6	(0.9)
Toon River	102	0	0	6	57	30	9	0	0	13.4	(0.7)
Ecstall River	100	0	0	4	45	40	11	0	0	13.6	(0.7)
Total	703	0	10	97	333	202	59	2	0	13.4	(0.8)

Table 6 (cont'd)

Area	N	Numbers of rays								Mean	(S.D.)
		10	11	12	13	14	15	16	17		
Central Coast											
Kitimat River	100	0	3	15	53	26	2	1	0	13.1	(0.8)
Kemano River	100	0	3	13	36	37	11	0	0	13.4	(1.0)
Green River	100	1	1	7	31	37	18	5	0	13.8	(1.1)
Mussel River	100	0	0	22	43	28	7	0	0	13.2	(0.9)
Kainet River	100	0	0	11	50	29	10	0	0	13.4	(0.8)
Kimsquit River	100	0	0	4	36	40	18	2	0	13.8	(0.9)
Neekas River	75	0	0	2	36	28	9	0	0	13.6	(0.7)
Cascade River	100	0	0	11	32	44	12	1	0	13.6	(0.9)
Elcho River	100	0	0	10	34	37	19	0	0	13.7	(0.9)
Bella Coola River	100	0	0	1	16	40	36	6	1	14.3	(0.9)
Clyak River	77	0	0	3	18	31	22	3	0	14.1	(0.9)
Wannock River	100	0	0	1	30	40	22	7	0	14.0	(0.9)
Nekite River	100	0	0	5	39	41	15	0	0	13.7	(0.8)
Total	1252	1	7	105	454	458	201	25	1	13.7	(0.9)

Table 6 (cont'd)

Area	N	Numbers of rays								Mean	(S.D.)
		10	11	12	13	14	15	16	17		
					West Coast Vancouver Island						
Stephens Creek	100	0	0	17	35	35	13	0	0	13.4	(0.9)
Marble River	97	0	1	5	23	48	20	0	0	13.8	(0.9)
Tahsish River	100	0	0	7	23	45	25	0	0	13.9	(0.9)
Zeballos River	100	0	0	4	24	54	17	1	0	13.9	(0.8)
Tahsis River	100	0	0	1	18	56	22	3	0	14.1	(0.7)
Sucwoa River	100	0	1	5	36	43	14	1	0	13.7	(0.9)
Canton River	100	0	0	7	31	41	18	3	0	13.8	(0.9)
Conuma River	100	0	1	20	28	41	9	1	0	13.4	(1.0)
Burman River	100	0	0	7	24	42	24	3	0	13.9	(0.9)
Megin River	100	0	0	8	23	47	20	2	0	13.9	(0.9)
Atleo River	100	0	1	9	34	32	17	5	2	13.8	(1.1)
Thornton Creek	100	0	0	18	40	36	6	0	0	13.3	(0.8)
Nahmint River	100	0	0	10	24	45	19	2	0	13.8	(0.9)
Sarita River	100	0	0	7	34	42	17	0	0	13.7	(0.8)
Nitinat River	100	0	0	8	33	42	17	0	0	13.7	(0.9)
Total	1497	0	4	133	430	649	258	21	2	13.7	(0.9)

Table 6 (cont'd)

Area	N	Numbers of rays								Mean	(S.D.)
		10	11	12	13	14	15	16	17		
						South Coast					
Orford River	100	0	12	13	40	31	4	0	0	13.0	(1.0)
Homathko River	106	0	0	14	44	39	9	0	0	13.4	(0.8)
Toba River	98	0	0	12	45	28	13	0	0	13.4	(0.9)
Squamish River	100	0	0	14	49	33	4	0	0	13.3	(0.8)
Alouette River	100	0	0	14	47	31	8	0	0	13.3	(0.8)
Chilqua Slough	100	0	0	13	46	35	5	1	0	13.4	(0.8)
Chehalis River	100	0	0	9	47	38	6	0	0	13.4	(0.7)
Total	704	0	12	89	318	235	49	1	0	13.3	(0.8)

Table 7. Male chum salmon mean postorbital head length (mm), caudal peduncle depth (mm), anal fin base length (mm), anal fin height(mm), dorsal fin base length (mm), and dorsal fin height (mm) for chum salmon sampled during 1983-1985. Measurements for each individual were standardized to 60.0 cm postorbital-hypural length. Standard deviation is in parenthesis.

Area	N	Head	Caudal depth	Anal base	Anal height	Dorsal base	Dorsal height
				Queen Charlotte Islands			
Stanley Creek	24	95.5 (3.1)	56.6 (3.7)	88.0 (4.3)	57.5 (7.7)	82.3 (5.7)	105.6 (7.4)
Ain River	82	95.4 (3.9)	53.1 (3.3)	85.7 (4.4)	69.0 (6.9)	79.7 (4.1)	108.1 (5.4)
Awun River	81	94.1 (3.4)	53.0 (2.9)	83.4 (4.5)	67.0 (6.1)	79.3 (4.4)	101.0 (9.4)
Lagins Creek	79	99.0 (4.5)	53.3 (2.6)	86.0(10.6)	71.5 (6.5)	79.7 (4.2)	113.6 (6.6)
Security Creek	73	97.7 (3.4)	52.9 (3.2)	87.7 (5.3)	70.0 (5.9)	80.3 (4.7)	109.5 (7.9)
Deena River	43	97.5 (3.9)	52.5 (4.4)	81.6(23.0)	71.7 (6.2)	80.7 (6.7)	108.4 (7.4)
Pallant Creek	40	96.8 (6.0)	51.3 (2.9)	85.9 (4.6)	78.7 (6.1)	77.4 (4.7)	112.2 (7.8)
Lagoon Creek	61	96.3 (3.7)	51.4 (2.8)	88.2 (4.1)	75.6 (5.6)	78.0 (4.4)	111.3 (6.3)
Tasu Creek	83	97.8 (4.2)	51.1 (2.6)	85.0(14.0)	71.8 (5.7)	78.4 (9.1)	109.2 (7.2)
Salmon River	60	96.3 (4.5)	51.4 (3.0)	84.8 (5.1)	71.0 (7.9)	80.9 (4.6)	105.8 (9.7)
Total	626	96.7 (4.3)	52.5 (3.5)	85.6 (9.6)	70.7 (6.9)	79.5 (5.6)	108.5 (8.4)
				North Coast			
Toon River	71	95.8 (4.2)	49.9 (3.3)	83.1 (4.7)	72.0 (6.1)	81.5 (4.2)	109.9 (7.0)
Khutzeymateen River	64	97.6 (4.9)	51.9 (4.0)	86.3 (4.6)	72.4 (6.3)	84.0 (6.2)	108.7 (6.5)
Kitsault River	50	93.5 (4.2)	50.4 (3.0)	81.9 (4.5)	71.9 (5.6)	79.0 (5.4)	108.6 (6.9)
Stagoo River	55	93.8 (7.0)	49.4 (3.7)	81.5 (6.4)	69.9 (7.4)	77.8 (6.7)	103.5 (8.2)
Kshwan River	63	91.6 (5.2)	51.7 (3.5)	80.2 (6.1)	67.8 (7.0)	77.2 (5.8)	104.9 (7.7)
Nass River	46	100.5 (4.5)	55.1 (3.2)	86.5(22.4)	75.2 (5.4)	81.7 (5.1)	107.0 (8.7)
Ecstall River	52	97.4 (4.7)	51.8 (3.4)	83.2(12.8)	72.6 (6.5)	83.2 (6.5)	109.2 (7.0)
Total	401	95.6 (5.7)	51.3 (3.8)	83.2(10.2)	71.6 (6.7)	80.6 (6.2)	107.5 (7.7)

Table 7 (cont'd)

Area	N	Head	Caudal depth	Anal base	Anal height	Dorsal base	Dorsal height
				Central Coast			
Bella Coola	38	87.3 (3.8)	52.1 (3.5)	81.1(14.9)	72.4 (5.2)	79.4 (4.7)	106.2 (7.8)
Kemano River	73	101.3 (3.9)	57.5 (3.1)	77.8(33.8)	74.9 (6.5)	86.6(15.0)	114.5 (6.1)
Kimsquit River	56	94.1 (5.3)	52.8 (3.3)	83.4 (5.8)	73.6 (6.2)	79.2(11.7)	107.7 (7.4)
Clyak River	43	94.0 (7.1)	51.9 (3.0)	77.8(14.4)	71.8 (7.6)	80.3 (5.0)	106.7 (8.8)
Kitimat River	52	97.5 (8.5)	52.6 (4.5)	84.8(14.6)	71.3 (6.1)	82.8 (7.8)	103.1 (9.6)
Mussel River	49	98.5 (5.8)	47.8 (4.8)	80.0 (6.2)	65.6 (6.5)	76.7 (5.5)	109.0 (8.3)
Neekas Creek	49	92.1 (5.3)	50.8 (3.9)	82.6 (5.5)	69.4 (8.4)	77.4 (6.3)	108.1 (7.0)
Kainet Creek	64	95.1 (5.6)	51.3 (3.5)	83.0 (5.3)	70.7 (6.1)	79.9 (5.6)	105.8 (7.6)
Nekite Creek	45	94.5 (4.0)	48.3 (3.5)	80.2 (5.0)	68.1 (6.0)	79.7 (5.8)	107.9 (7.9)
Green River	59	94.4 (3.8)	49.5 (2.6)	85.6 (5.9)	59.8 (6.3)	78.0 (5.1)	103.8 (6.3)
Cascade River	68	87.6 (8.3)	46.8 (3.9)	77.9(10.5)	60.5 (6.5)	75.6(10.7)	101.1 (7.2)
Elcho River	64	97.3 (5.8)	48.0 (4.1)	79.0 10.9)	63.4 (7.3)	79.8 (6.5)	110.3 (9.2)
Wannock River	75	94.5 (4.4)	53.9 (3.2)	83.2(10.7)	74.5 (7.4)	80.0 (4.6)	108.9 (7.2)
	735	94.8 (6.5)	51.2 (4.7)	81.3(14.2)	68.9 (8.4)	79.8 (8.7)	107.3 (8.4)

Table 7 (cont'd)

Area	N	Head	Caudal depth	Anal base	Anal height	Dorsal base	Dorsal height
				West Coast Vancouver Island			
Stephens Creek	63	98.9 (3.3)	52.2 (2.8)	88.8 (4.2)	68.1 (8.3)	80.8 (4.1)	107.6(10.4)
Marble River	64	96.2 (3.6)	53.4 (2.3)	84.8 (4.3)	73.1 (5.4)	77.5 (3.7)	108.1 (6.4)
Tahsish River	60	97.1 (5.1)	52.5 (3.3)	86.9 (4.9)	66.1 (7.2)	79.9 (4.6)	99.8 (7.6)
Zeballos River	56	96.7 (4.3)	47.7 (3.0)	85.9 (4.7)	66.2 (6.3)	81.5 (4.3)	105.0 (6.5)
Tahsis River	58	96.2 (4.2)	46.7 (3.3)	82.1 (5.6)	68.9 (6.2)	74.5(14.4)	98.3 (8.5)
Sucwoa River	50	96.0 (5.1)	49.8 (4.0)	82.1 (6.5)	67.5 (8.0)	80.3 (6.4)	101.3(10.1)
Canton River	55	95.6 (4.3)	43.9 (3.0)	82.6 (4.5)	61.6 (5.7)	74.3(10.9)	93.6 (8.3)
Conuma River	51	101.3 (4.3)	55.8 (3.0)	87.7(12.7)	81.1 (5.8)	85.2 (4.9)	116.6 (5.9)
Burman River	62	96.3 (4.7)	47.6 (3.6)	81.2(11.6)	70.3 (7.1)	79.4 (5.1)	103.7(10.1)
Megin River	42	94.5 (4.3)	44.4 (3.2)	81.7 (5.0)	67.3 (6.6)	79.3 (5.3)	105.1 (6.3)
Atleo River	71	97.0 (4.1)	52.5 (2.6)	86.2 (6.4)	70.9 (8.0)	80.7 (4.0)	109.4 (9.1)
Thornton Creek	56	94.5 (3.8)	47.3 (2.8)	85.0 (3.9)	65.3 (7.2)	75.7 (3.8)	100.1 (9.5)
Nahmint River	65	95.6 (5.1)	50.7 (3.2)	84.2(15.1)	67.2 (7.4)	81.7 (5.6)	99.6 (8.8)
Nitinat River	50	98.7 (3.1)	54.0 (2.7)	87.2 (3.7)	72.4 (6.2)	81.7 (3.7)	103.9 (7.9)
Sarita River	65	98.4 (4.7)	53.2 (2.4)	86.8 (4.7)	73.7 (6.8)	79.9 (4.2)	108.8 (7.7)
Total	868	96.9 (4.6)	50.3 (4.5)	85.0 (7.8)	69.3 (8.1)	79.5 (6.9)	104.1 (9.9)

Table 7 (cont'd)

Area	N	Head	Caudal depth	Anal base	Anal height	Dorsal base	Dorsal height
				South Coast			
Orford River	51	93.8 (4.7)	53.0 (4.0)	83.4 (4.6)	73.7 (5.4)	82.0 (4.3)	114.1 (7.1)
Homathko River	40	96.1 (3.9)	47.1 (2.3)	77.7 (4.5)	70.2 (4.7)	72.3 (4.9)	104.5 (5.5)
Toba River	45	93.1 (4.3)	47.7 (2.6)	75.3 (4.4)	66.9 (4.6)	71.0 (5.2)	99.0 (6.0)
Squamish River	30	96.4 (4.2)	48.5 (3.5)	80.9 (4.3)	69.9 (3.8)	73.0 (5.5)	100.6 (5.6)
Alouette River	66	101.6 (3.9)	52.8 (2.8)	82.3 (5.1)	71.6 (5.3)	77.3 (5.1)	109.0 (5.8)
Chilqua Slough	49	97.8 (4.2)	47.6 (2.6)	83.7 (4.5)	72.6 (4.6)	80.1 (4.5)	106.0 (6.4)
Chehalis River	49	98.6 (5.5)	47.6 (4.5)	81.6 (5.2)	69.9 (4.6)	75.3 (5.9)	103.9 (5.5)
Total	330	97.1 (5.2)	49.5 (4.1)	80.9 (5.5)	70.9 (5.2)	76.3 (6.3)	105.9 (7.6)
Queen Charlotte Is.	626	96.7 (4.3)	52.5 (3.5)	85.6 (9.6)	70.7 (6.9)	79.5 (5.6)	108.5 (8.4)
North Coast	401	95.6 (5.7)	51.3 (3.8)	83.2(10.2)	71.6 (6.7)	80.6 (6.2)	107.5 (7.7)
Central Coast	735	94.8 (6.5)	51.2 (4.7)	81.3(14.2)	68.9 (8.4)	79.8 (8.7)	107.3 (8.4)
West Coast	868	96.9 (4.6)	50.3 (4.5)	85.0 (7.8)	69.3 (8.1)	79.5 (6.9)	104.1 (9.9)
South Coast	330	97.1 (5.2)	49.5 (4.1)	80.9 (5.5)	70.9 (5.2)	76.3 (6.3)	105.9 (7.6)

Table 8. Female chum salmon mean postorbital head length (mm), caudal peduncle depth (mm), anal fin base length (mm), anal fin height (mm), dorsal fin base length (mm), and dorsal fin height (mm) for chum salmon sampled during 1983-1985. Measurements for each individual were standardized to 60.0 cm postorbital-hypural length. Standard deviation is in parenthesis.

Area	N	Head	Caudal depth	Anal base	Anal height	Dorsal base	Dorsal height
				Queen Charlotte Islands			
Stanley Creek	42	86.8 (3.7)	47.8 (3.6)	82.7(12.2)	60.6 (7.0)	71.0 (3.4)	93.5 (8.1)
Ain River	18	88.2 (2.8)	52.8 (2.5)	86.6 (4.7)	69.8 (6.7)	72.9 (3.7)	103.1 (6.3)
Awun River	19	86.7 (3.5)	52.9 (2.2)	86.9 (4.1)	70.5 (8.0)	71.8 (3.8)	97.8 (9.5)
Lagins Creek	21	88.8 (3.8)	53.8 (2.6)	77.6(25.8)	70.8 (5.3)	72.6 (5.2)	98.7 (6.6)
Security Creek	27	90.0 (4.6)	49.2 (3.0)	83.8 (4.2)	69.8 (4.7)	71.5 (3.9)	101.3 (5.4)
Deena River	57	88.5 (3.6)	51.9 (2.8)	85.3(12.6)	70.5 (4.6)	72.8 (3.2)	100.1 (6.1)
Pallant Creek	60	89.6 (3.2)	49.5 (2.9)	86.7(12.0)	73.8 (5.2)	70.8 (3.1)	101.2 (5.2)
Lagoon Creek	39	89.9 (4.5)	51.4 (3.0)	85.7(14.1)	66.4(11.0)	70.9 (4.6)	96.3 (9.5)
Tasu Creek	17	88.9 (3.9)	49.9 (2.0)	86.5 (3.5)	68.8 (3.8)	68.2 (2.8)	96.2 (6.7)
Salmon River	40	89.5 (5.4)	51.0 (3.9)	84.9(14.7)	69.7 (8.6)	71.0 (4.8)	99.4(10.0)
Total	340	88.8 (4.1)	50.7 (3.4)	84.9(12.8)	69.2 (7.8)	71.4 (3.9)	98.8 (7.8)
				North Coast			
Toon River	31	86.8 (6.4)	49.6 (3.5)	82.6(16.7)	71.4 (7.3)	73.5 (6.6)	104.2(10.4)
Khutzeymateen River	36	88.6 (3.7)	49.9 (3.6)	85.1 (4.8)	70.2 (6.5)	76.7 (4.1)	103.8 (6.9)
Kitsault River	50	87.0 (4.8)	50.9 (3.8)	85.5 (5.0)	70.9 (5.7)	73.1 (5.9)	103.3 (7.0)
Stagoo River	45	85.0 (2.9)	47.7 (3.6)	84.0 (6.0)	67.5 (5.9)	73.1 (4.8)	102.6 (9.7)
Kshwan River	37	84.9 (5.6)	47.7 (3.5)	82.9 (6.5)	69.8 (8.3)	69.6(12.1)	96.9 (9.7)
Nass River	55	92.6 (4.5)	54.9 (3.6)	89.6(12.5)	73.4 (5.8)	76.2 (5.7)	98.2 (9.0)
Ecstall River	48	86.3 (5.2)	49.2 (3.6)	85.6(12.8)	71.4 (7.7)	75.8 (6.7)	101.6 (8.0)
Total	302	87.5 (5.4)	50.3 (4.3)	85.4(10.2)	70.8 (6.9)	74.1 (7.1)	101.4 (9.0)

Table 8 (cont'd)

Area	N	Head	Caudal depth	Anal base	Anal height	Dorsal base	Dorsal height
				Central Coast			
Bella Coola River	62	84.9 (3.8)	49.9 (2.8)	84.8 (5.6)	74.3 (5.1)	70.1 (4.6)	98.5 (5.8)
Kemano River	27	91.9 (3.2)	54.0 (3.0)	85.2(24.8)	71.0 (7.1)	76.9 (3.5)	103.6 (6.1)
Kimsquit River	44	85.7 (4.6)	50.3 (3.8)	85.4 (4.5)	70.3 (7.7)	73.5 (5.1)	100.4 (7.3)
Clyak River	34	87.6 (5.4)	51.6 (3.8)	83.6(15.4)	67.4 (7.8)	76.3 (5.7)	101.4 (8.4)
Kitimat River	48	90.4 (7.4)	52.2 (3.8)	84.6(17.6)	68.5 (5.7)	74.1 (7.8)	95.6 (9.6)
Mussel River	51	92.4 (4.4)	46.9 (3.0)	85.4 (5.3)	63.5 (6.8)	74.7 (4.9)	101.3 (7.3)
Neekas Creek	26	84.0 (5.0)	48.0 (4.3)	84.7 (6.5)	69.2 (7.4)	70.7 (5.2)	102.6 (9.9)
Kainet Creek	36	87.0 (4.2)	49.1 (4.5)	87.8 (6.0)	65.0 (7.6)	73.2 (5.2)	98.1 (8.1)
Nekite River	55	86.1 (3.0)	49.2 (3.8)	84.0 (5.7)	67.5 (6.7)	75.5 (4.9)	102.3 (6.3)
Green River	41	84.2 (4.9)	47.3 (3.3)	81.7(13.4)	57.6 (5.9)	74.4 (5.4)	97.4 (7.1)
Cascade River	32	82.8 (4.7)	46.9 (3.3)	80.8 (4.3)	60.9 (6.1)	69.4 (5.3)	94.7 (7.9)
Elcho River	36	84.8 (3.5)	45.8 (3.4)	60.3(42.6)	61.1 (6.3)	71.2 (5.2)	96.0 (8.5)
Wannock River	25	86.0 (3.9)	51.1 (2.8)	86.0(18.6)	71.6 (6.0)	75.6 (5.1)	101.5 (7.0)
Total	517	86.9 (5.4)	49.3 (4.1)	82.8(16.9)	66.9 (8.1)	73.4 (5.8)	99.4 (8.0)

Table 8 (cont'd)

Area	N	Head	Caudal depth	Anal base	Anal height	Dorsal base	Dorsal height
				West Coast Vancouver Island			
Stephens Creek	37	90.7 (3.2)	50.9 (3.1)	89.1 (4.5)	67.0 (8.9)	73.2 (5.2)	104.5(10.8)
Marble Creek	33	87.3 (3.2)	50.3 (2.1)	87.4 (5.4)	71.6 (5.3)	70.8 (5.5)	95.8 (9.4)
Tahsish River	40	89.5 (2.6)	50.2 (2.0)	90.2 (3.7)	70.3 (5.9)	74.6 (3.4)	90.9 (6.6)
Zeballos River	44	87.7 (4.3)	45.5 (3.0)	84.9 (4.8)	63.1 (7.2)	71.2 (4.2)	95.4 (6.5)
Tahsis River	42	86.9 (3.7)	45.2 (3.4)	84.1 (5.3)	69.3 (5.9)	70.6 (5.5)	93.6 (8.5)
Sucwoa River	50	86.0 (3.4)	47.7 (2.4)	83.5 (5.4)	69.9 (5.2)	72.8 (4.7)	93.4 (7.0)
Canton River	45	86.6 (2.9)	46.0 (2.5)	83.2 (4.1)	63.6 (6.0)	69.7 (4.7)	91.6 (8.0)
Conuma River	49	89.1 (4.3)	47.8 (3.0)	85.7(13.0)	68.6 (7.2)	72.1 (4.9	97.9 (7.0)
Burman River	38	88.7 (4.0)	48.0 (3.0)	83.0 (4.9)	70.1 (6.0)	70.5 (4.4)	97.9 (9.1)
Megin River	58	87.6 (3.9)	44.3 (3.2)	85.8 (4.4)	64.2 (6.8)	71.7 (5.4)	95.2 (8.1)
Atleo River	29	88.6 (3.5)	49.9 (2.2)	85.4 (4.3)	68.6 (6.4)	73.1 (3.9)	101.9 (7.9)
Thornton Creek	44	83.6 (4.7)	47.3 (2.1)	85.2(13.2)	67.5 (5.1)	70.5 (4.3)	92.1 (7.2)
Nahmint River	35	88.3 (3.2)	49.9 (2.7)	87.9 (3.0)	67.5 (7.5)	73.6 (3.7)	93.1 (6.4)
Sarita River	35	90.7 (3.2)	51.4 (2.3)	88.7 (3.9)	74.3 (5.5)	70.3 (3.9)	99.9 (8.1)
Nitinat River	50	86.8 (2.6)	48.6 (2.6)	83.5 (3.8)	70.4 (5.1)	68.9 (4.6)	93.2 (6.1)
Total	629	87.7 (4.0)	47.9 (3.4)	85.7 (6.9)	68.2 (6.9)	71.5 (4.8)	95.5 (8.5)

Table 8 (cont'd)

Area	N	Head	Caudal depth	Anal base	Anal height	Dorsal base	Dorsal height
				South Coast			
Orford River	49	84.6 (4.8)	49.0 (2.7)	84.4 (4.6)	70.7 (6.4)	75.1 (4.8)	102.6 (7.7)
Homathko River	66	88.7 (3.4)	45.3 (2.8)	77.6 (3.6)	70.3 (4.2)	64.9 (4.0)	94.3 (5.3)
Toba River	53	87.9 (5.0)	46.3 (4.8)	73.0 (5.1)	66.7 (4.1)	64.5 (4.2)	91.1 (5.0)
Squamish River	70	88.6 (3.7)	48.6 (2.8)	81.9 (4.2)	72.1 (4.0)	68.9 (4.0)	93.8 (5.8)
Alouette River	34	90.6 (4.2)	49.4 (4.0)	86.4 (4.8)	74.5 (5.1)	70.6 (5.0)	96.5 (6.6)
Chilqua Slough	51	91.7 (3.2)	45.9 (3.3)	84.3(12.8)	72.1 (4.8)	70.4 (4.4)	99.0 (5.3)
Chehalis River	51	87.7 (3.0)	44.4 (2.0)	81.8 (4.6)	71.6 (3.8)	66.4 (4.1)	92.5 (5.5)
Total	374	88.5 (4.4)	46.9 (3.7)	81.0 (7.5)	71.0 (5.0)	68.4 (5.5)	95.4 (6.8)
Queen Charlotte Is.	340	88.8 (4.1)	50.7 (3.4)	84.9(12.8)	69.2 (7.8)	71.4 (3.9)	98.8 (7.8)
North Coast	302	87.5 (5.4)	50.3 (4.3)	85.4(10.2)	70.8 (6.9)	74.1 (7.1)	101.4 (9.0)
Central Coast	517	86.9 (5.4)	49.3 (4.1)	82.8(16.9)	66.9 (8.1)	73.4 (5.8)	99.4 (8.0)
West Coast	629	87.7 (4.0)	47.9 (3.4)	85.7 (6.9)	68.2 (6.9)	71.5 (4.8)	95.5 (8.5)
South Coast	374	88.5 (4.4)	46.9 (3.7)	81.0 (7.5)	71.0 (5.0)	68.4 (5.5)	95.4 (6.8)

Fig. 1. Locations where chum salmon were sampled during 1983-1985. Rivers listed in ascending order are: (1) Stanley Creek (2) Ain River (3) Awun River (4) Lagins Creek (5) Deena Creek (6) Pallant Creek (7) Lagoon Creek (8) Salmon River (9) Security Creek (10) Tasu Creek (11) Kshwan River (12) Kitsault River (13) Stagoo River (14) Nass River (15) Khutzeymateen River (16) Toon River (17) Ecstall River (18) Kitimat River (19) Kemano River (20) Green River (21) Mussel River (22) Kainet Creek (23) Kimsquit River (24) Cascade River (25) Neekas Creek (26) Elcho Creek (27) Bella Coola River (28) Clyak River (29) Wannock River (30) Nekite River (31) Homathko River (32) Orford River (33) Toba River (34) Squamish River (35) Alouette River (36) Chilqua Slough (37) Chehalis River (38) Stephens Creek (39) Marble River (40) Nimpkish River (41) Tahsish River (42) Zeballos River (43) Tahsis River (44) Sucwoa River (45) Canton River (46) Conuma River (47) Burman River (48) Megin River (49) Atleo River (50) Nahmint River (51) Thornton Creek (52) Sarita River (53) Nitinat River

miles
0
100
200
kilometers
0
100
200
QUEEN CHARLOTTE ISLANDS
VANCOUVER ISLAND